CLAIMS

We claim:

1. A method for correlating a signal, the signal compliant with at least one specification selected from IEEE 802.11a WLANs and HIPERLAN/2, with a sequence of alternative correlator coefficients associated with specified non-negative integer n, the method comprising the steps of:

sampling the signal to generate a plurality of real signal samples and a plurality of imaginary signal samples;

scaling the plurality of real signal samples in accordance with the sequence of alternative correlator coefficients to generate a plurality of scaled real signal samples;

scaling the plurality of imaginary signal samples in accordance with the sequence of alternative correlator coefficients to generate a plurality of scaled imaginary signal samples;

combining, in accordance with a specified correlator form, a first subset of the plurality of scaled real signal samples and a second subset of the plurality of scaled imaginary signal samples to generate at least one correlator output.

2. The method of claim 1 wherein a correlator coefficient value of 0 for a signal sample is implemented in the scaling step by not using the signal sample in the combining step.

3. The method of claim 1 wherein a correlator coefficient value of -1 for a signal sample is implemented in the scaling step by inverting the signal sample in the combining step.

4. The method of claim 1 wherein a correlator coefficient value of 0.5 for a signal sample is implemented in the scaling step by shifting the signal sample in a shift register prior to the combining step.

5. The method of claim 1 wherein imaginary and real signal parts are handled in separate data streams prior to the combining step

6. The method of claim 1 wherein a signal sample is detected at the input to a storage location.

7. The method of claim 1 wherein one or more of a first plurality of storage locations, having at least one real signal sample, and a second plurality of storage locations, having at least one imaginary signal sample, are connected together as a shift register.

8. The method of claim 1 wherein the sequence of alternative correlator coefficients are members of the group consisting of $\{-1, -1 + 2^{-n}, -1 + 2\times 2^{-n}, -1 + 3\times 2^{-n}, \ldots, 1\}$.

9. The method of claim 1 wherein the specified correlator form is $\Xi_n = \sum_{m=1}^{16} r_{n-16+m} a_m$ wherein furthermore a_m is the scaling factor for signal sample r_{n-16+m}.

10. A method as set forth in claim 1, wherein the integer n is chosen from the group consisting of 0, 1, and 2.

11. A method as set forth in claim 1 wherein the sampling step is applied to a in-phase part of a baseband signal to generate the plurality of real signal samples.

12. A method as set forth in claim 1 wherein the sampling step is applied to a quadrature-phase part of a baseband signal to generate the plurality of imaginary signal samples.

13. An apparatus for performing correlation on a plurality of streams of signal samples as inputs, thereby producing a plurality of correlation results, the apparatus comprising:

means for handling a first stream in the plurality of streams;

means for handling a second stream in the plurality of streams;

at least one first computing means, having a plurality of inputs and at least one output, for performing at least one operation from the group consisting of scaling, addition, shifting, and subtraction on one or more of the first stream and the second stream, and a current value of a stream of samples from the plurality of streams of samples; and

at least one second computing means for performing addition operation on outputs of the at least one first computing means to generate a first correlation result.

14. An apparatus as set forth in claim 13, wherein the means for handling a first stream is a shift register that stores finite-precision numbers.

15. An apparatus as set forth in claim 13, wherein furthermore, the apparatus is a part of a receiver compliant with the IEEE 802.11a WLANs or HIPERLAN/2 specifications.

16. An apparatus as set forth in claim 13, wherein furthermore, the at least one second computing means receives as input, outputs from two first computing means, each first computing means in turn, receiving its input from a distinct stream from the plurality of streams of signal samples.

17. An apparatus as set forth in claim 13, wherein furthermore, the plurality of streams of signal samples correspond to an imaginary signal sample stream and a real signal sample stream for a complex signal.

18. An apparatus as set forth in claim 13, wherein furthermore, the at least one first computing means is selected from the group consisting of a 5-input-1-output computing means, a 7-input-1-output computing means, and a 9-input-1-output computing means.

19. An apparatus as set forth in claim 13, wherein furthermore, the first correlation result corresponds to alternative correlators selected from correlator set {-1, 0, 1, 1, 1, 0, -1, 0, i, 0, -i, -i, -i, 0, i, 0}, correlator set {-0.5, 0.5i, 1, 0.5, 1, 0.5i, -0.5, 0, 0.5i, -0.5, -i, -0.5i, -i, -0.5, 0.5i, 0}, and correlator set {-0.5, 0.5i, 1, 0.5, 1, 0.5i, -0.5, 0.5 - 0.5i, 0.5i, -0.5, -i, -0.5i, -i, -0.5, 0.5i, 0.5 - 0.5i}.

20. An apparatus as set forth in claim 13, wherein furthermore, the first correlation result is generated in real time.

21. An apparatus as set forth in claim 13, wherein furthermore, the at least one first computing means and the at least one second computing means do not carry out multiplication operations.

22. A method for correlating a complex-valued received signal samples with a 16-point waveform, to produce a complex-valued correlation result at about each sampling instant, wherein the complex-valued received signal samples and the 16-point waveform are compliant with IEEE 802.11a WLANs or HIPERLAN/2, the method comprising the steps of:

selecting a 16-point waveform representation from the group consisiting of waveform representation {-1, 0, 1, 1, 1, 0, -1, 0, i, 0, -i, -i, -i, 0, i, 0}, waveform representation {-0.5, 0.5i, 1, 0.5, 1, 0.5i, -0.5, 0, 0.5i, -0.5, -i, -0.5i, -i, -0.5, 0.5i, 0}, and waveform representation {-0.5, 0.5i, 1, 0.5, 1, 0.5i, -0.5, 0.5 - 0.5i, 0.5i, -0.5, -i, -0.5i, -i, -0.5, 0.5i, 0.5 - 0.5i};

splitting a received signal into a plurality of streams;

storing, in a shift registor configuration, signal samples from at least one signal stream;

scaling, in accordance with a selected 16-point representation, at least one stored signal samples by one operation from the group consisting of inverting, and shifting;

processing, in accordance with a selected 16-point representation, the at least one stored signal sample by adding it to at least one other signal sample from the same signal stream to produce a first interim output; and

generating the complex valued correlation result by combining the first interim output with a second interim output.

23. A method of claim 22 wherein the at least one other signal sample is scaled prior to the processing step.